

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

**GCSE
MATHEMATICS**

H

Higher Tier Paper 2 Calculator

8300/2H

Thursday 7 June 2018 Morning

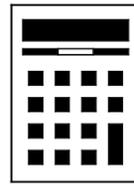
Time allowed: 1 hour 30 minutes

**At the top of the page, write your
surname and other names, your centre
number, your candidate number and
add your signature.**

[Turn over]

For this paper you must have:

- **a calculator**
- **mathematical instruments.**



INSTRUCTIONS

- **Use black ink or black ball-point pen. Draw diagrams in pencil.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write on blank pages.**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**

INFORMATION

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 80.**
- **You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.**

ADVICE

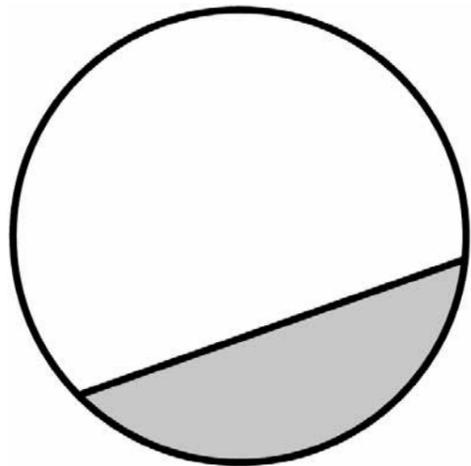
- **In all calculations, show clearly how you work out your answer.**

**DO NOT TURN OVER UNTIL TOLD
TO DO SO**



Answer ALL questions in the spaces provided

1 Here is a circle.



Circle the word that describes the shaded part. [1 mark]

segment

chord

sector

arc

2 Circle the number that is in standard form. [1 mark]

0.25×10^4

6×10^7

38×10^{-3}

$4 \times 10^{\frac{1}{2}}$



3 y is $1\frac{1}{2}$ times x .

Circle the ratio that is equivalent to $y : x$

[1 mark]

2 : 5

5 : 2

3 : 2

2 : 3

4 Work out 40 as a percentage of 10

Circle your answer. [1 mark]

4%

25%

300%

400%

[Turn over]

4



5 Match each sequence to its description.

**One has been done for you.
[4 marks]**

1 1 2 3 5 8

**Arithmetic
progression**

1 2 4 8 16 32

**Geometric
progression**

1 2 3 4 5 6

**Fibonacci
sequence**

1 3 6 10 15 21

**Triangular
numbers**

1 4 9 16 25 36

**Cube
numbers**

1 8 27 64 125 216

**Square
numbers**



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[Turn over]



6 The table shows information about the population of a city.

Population in 2001	Population in 2011
420 000	480 000

**Liam claims,
“From 2011 to 2021 the
population of the city will
increase by the same percentage
as from 2001 to 2011”**

**He works out,
population increase from 2001 to
2011**

$$= 480\,000 - 420\,000$$

$$= 60\,000$$

population in 2021

$$= 480\,000 + 60\,000$$

$$= 540\,000$$



- 7** On three days, Ali throws darts at a target.
Here are his results.

	Number of throws	Number of hits	Number of misses
Monday	20	15	5
Tuesday	30	22	8
Wednesday	40	17	23
Total	90	54	36

7 (a) Work out TWO different estimates for the probability of Ali hitting the target. [2 marks]

Answer _____ **and** _____

7 (b) Which of your two answers is the better estimate for the probability of Ali hitting the target? Give a reason for your answer. [1 mark]

Answer _____

Reason _____

[Turn over]



Answer _____

6

[Turn over]

9 The length of each side of a regular pentagon is 8.4 cm to 1 decimal place.

9 (a) Complete the error interval for the length of one side. [2 marks]

_____ cm \leq length < _____ cm

9 (b) Complete the error interval for the perimeter. [1 mark]

_____ cm \leq perimeter < _____ cm

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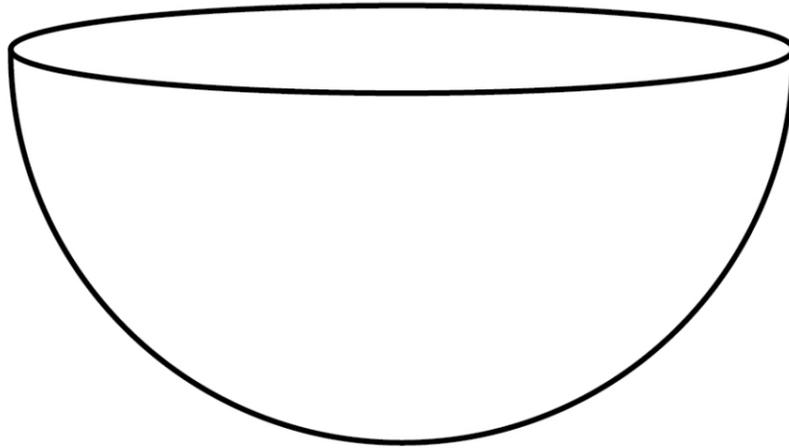
[Turn over]



10

Volume of a sphere = $\frac{4}{3}\pi r^3$
where r is the radius

A container is a hemisphere of radius 30 cm



Sand fills the container at a rate of 4000 cm^3 per minute.

Does it take **LESS THAN** a quarter of an hour to fill the container?

You **MUST** show your working.
[3 marks]

11 (b) Work out the probability that BOTH dice land on a number less than 3 [1 mark]

Answer _____

11 (c) Work out the probability that EXACTLY ONE of the dice lands on a number less than 3 [2 marks]

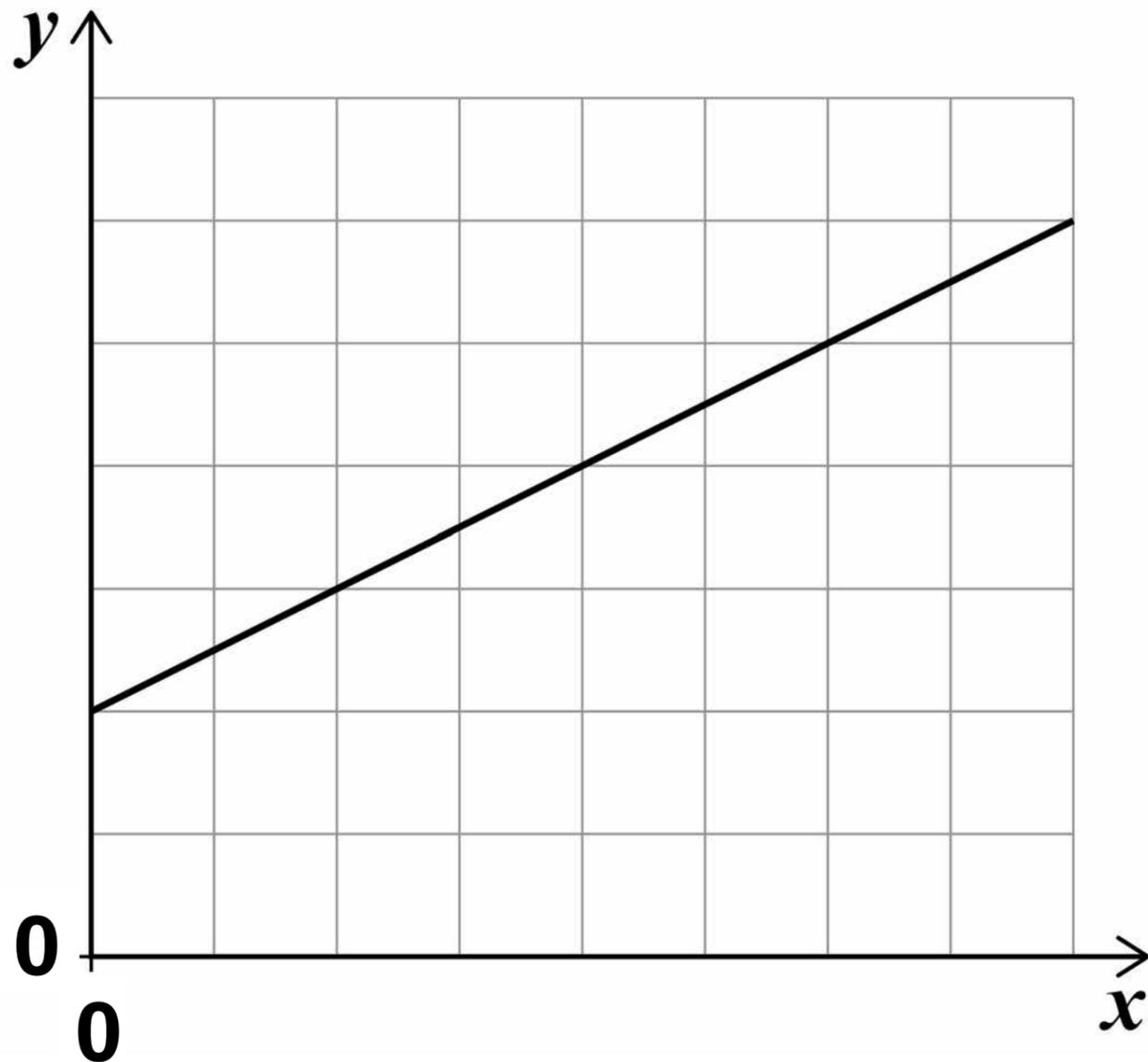
Answer _____

[Turn over]



12 Take the sides of all squares of the grid to be 1 cm long.

A straight line is drawn on the centimetre grid.



Fay assumes that the scale is 1 cm represents 1 unit.

12 (a) Use her assumption to work out the gradient of the line. [1 mark]

Answer _____

12 (b) In fact, the scale is 1 cm represents 2 units. Which statement is correct?

Tick ONE box. [1 mark]

The answer to part (a) is too big

The answer to part (a) stays the same

The answer to part (a) is too small

[Turn over]

2



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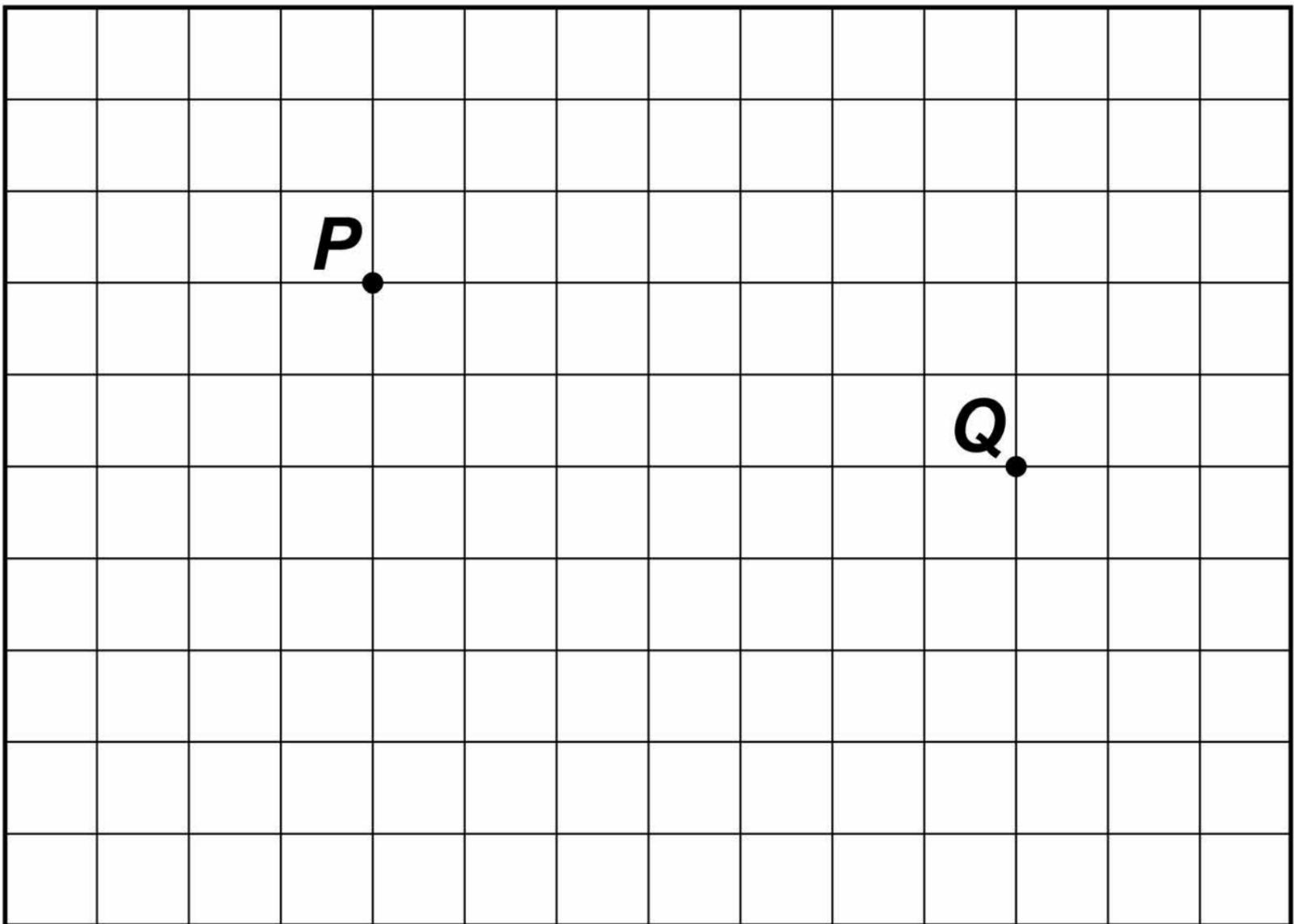
[Turn over]



- 14 The scale drawing, on page 25, represents a garden.
Water from a sprinkler at P reaches up to 20 metres from P .
Water from a sprinkler at Q reaches up to 25 metres from Q .

SCALE: 1 cm represents 5 m

Take the sides of all squares of the grid to be 1 cm long.



Using a pair of compasses, show the region that water from BOTH sprinklers reaches. [2 marks]

[Turn over]

5

15 **100 men and 100 women took a test.**

SCORES

	Median	Interquartile range	Range
Men	28	7.5	31
Women	30	9	37

27

**Using this data, which statement
MUST be true?**

Tick ONE box. [1 mark]

**Men had a higher average
score than women**

**Men had more consistent
scores than women**

**A woman had the highest
score**

**A man had the lowest
score**

[Turn over]



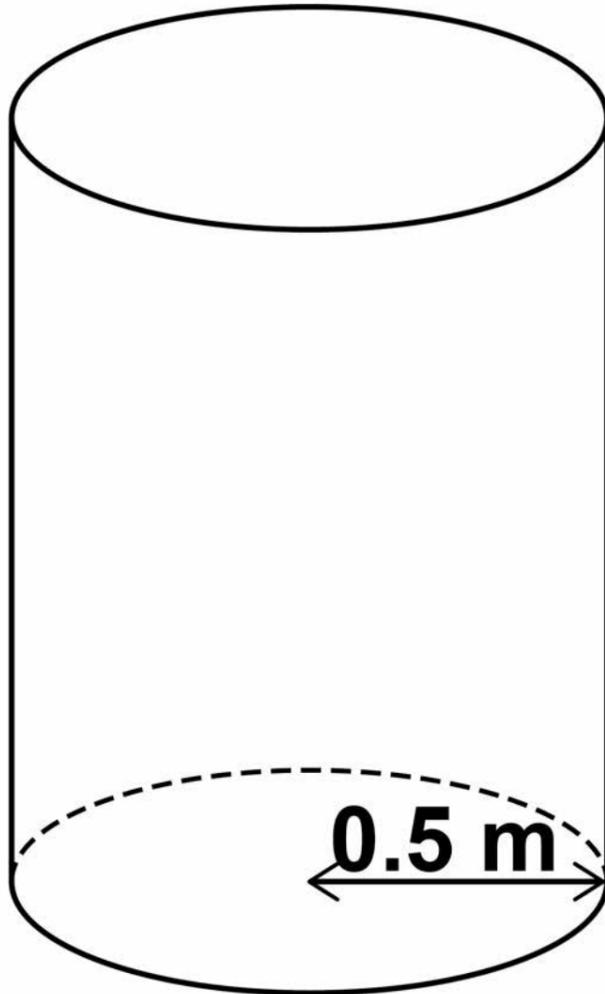
16 **Some concrete has volume
3.8 m³**

16 (a) **The density of the concrete is
2400 kg/m³**

**Work out the mass of the
concrete. [2 marks]**

Answer _____ **kg**

- 16 (b) The 3.8 m^3 of concrete is made into the shape of a cylinder. The base has radius 0.5 metres.



Work out the height of the cylinder. [2 marks]

Answer _____ m

[Turn over]

5



17 A ball is thrown vertically upwards.

The graph, on the opposite page, shows the height of the ball above the ground after it is thrown.

17 (a) For how many seconds is the ball at a height of **MORE THAN 2 metres?** [1 mark]

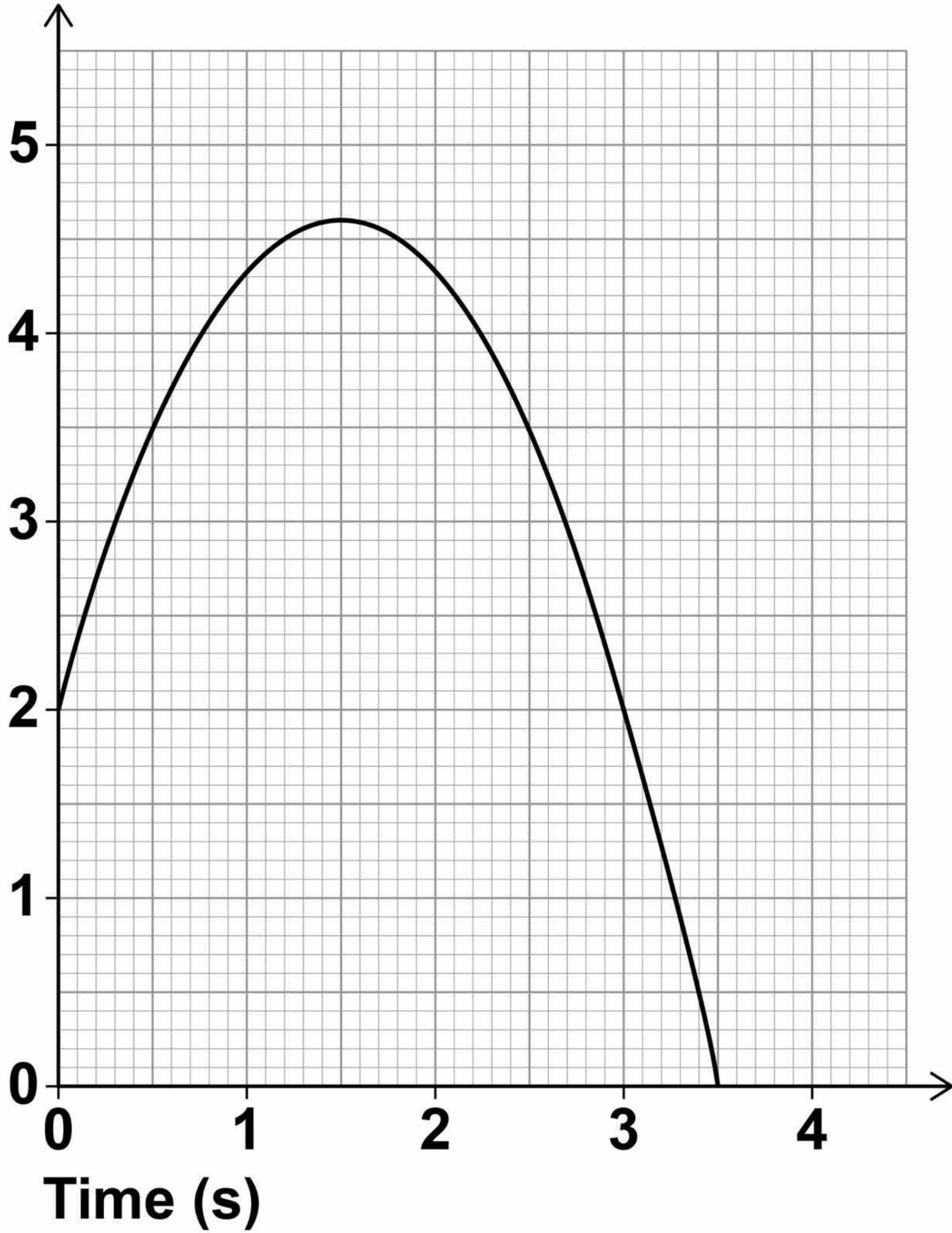
Answer _____ **s**

17 (b) After how many seconds is the ball at instantaneous rest when it is in the air? [1 mark]

Answer _____ **s**

Height
(m)

Height of ball



[Turn over]



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- 17 (c) Work out the average speed of the ball when it is moving downwards. [2 marks]

Answer _____ m/s

- 18 The solution of $3^x = 300$ lies between two consecutive integers.

Work out the two integers.
[1 mark]

Answer _____ and _____

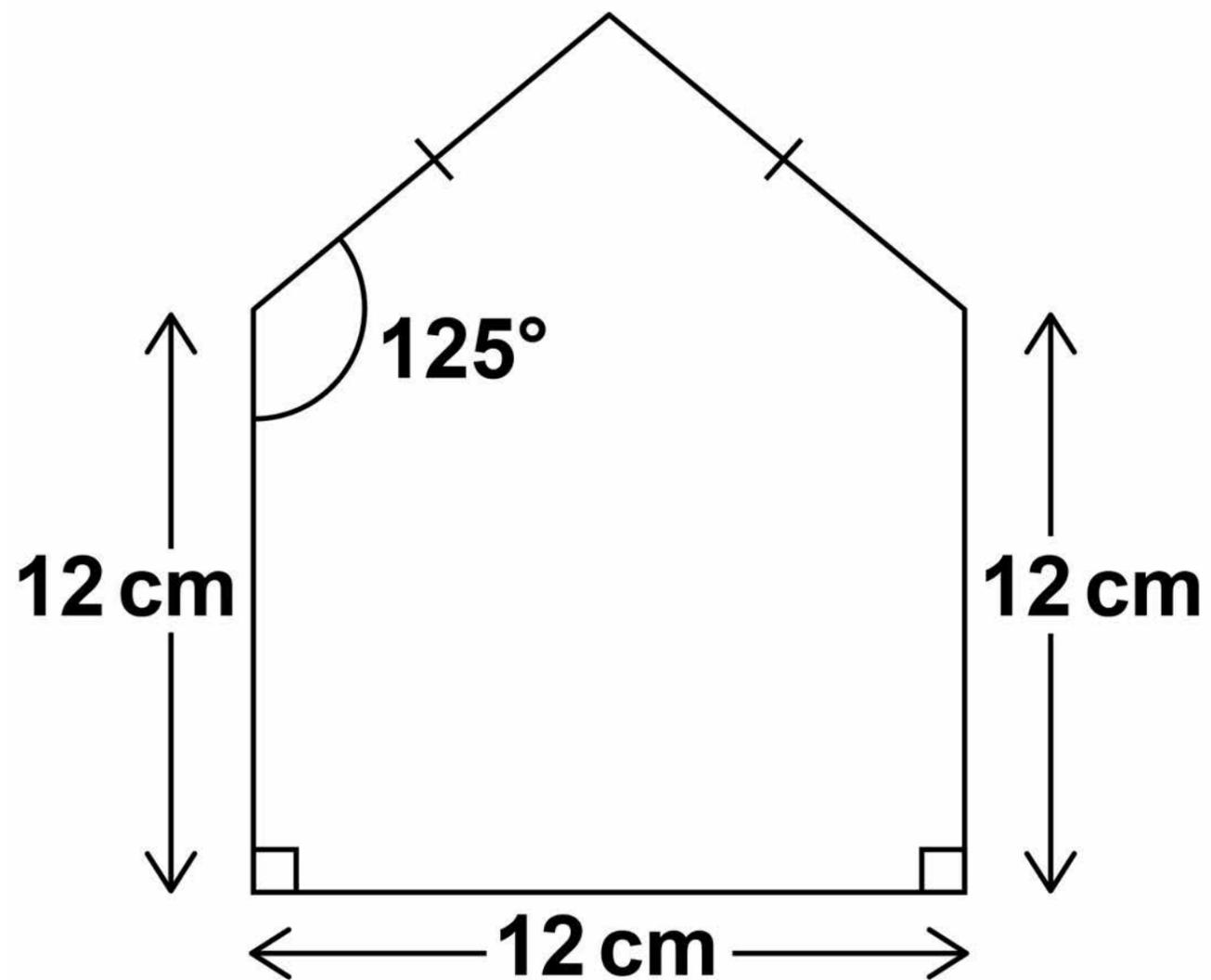
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5

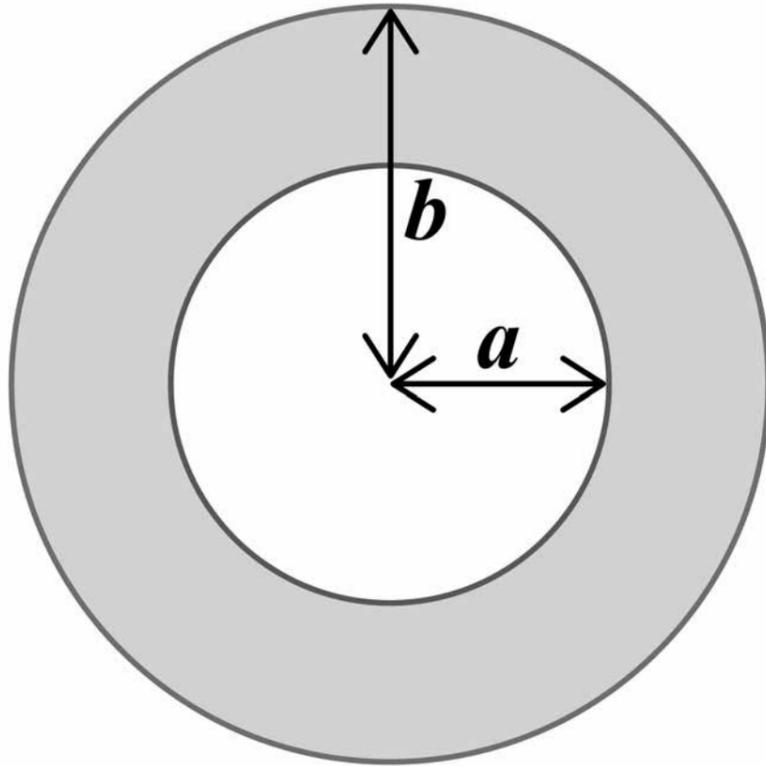


19 A pentagon is made from a square and an isosceles triangle.

The diagram is not drawn accurately.



- 20 Here is an inflated swimming ring with dimensions in centimetres.



The volume of the ring, $V \text{ cm}^3$, is given by

$$V = 0.25\pi^2 (b - a)^2 (b + a)$$

37

**Work out the volume when
 $a = 20$ and $b = 30$**

**Give your answer to 3 significant
figures. [3 marks]**

Answer _____ **cm³**

7

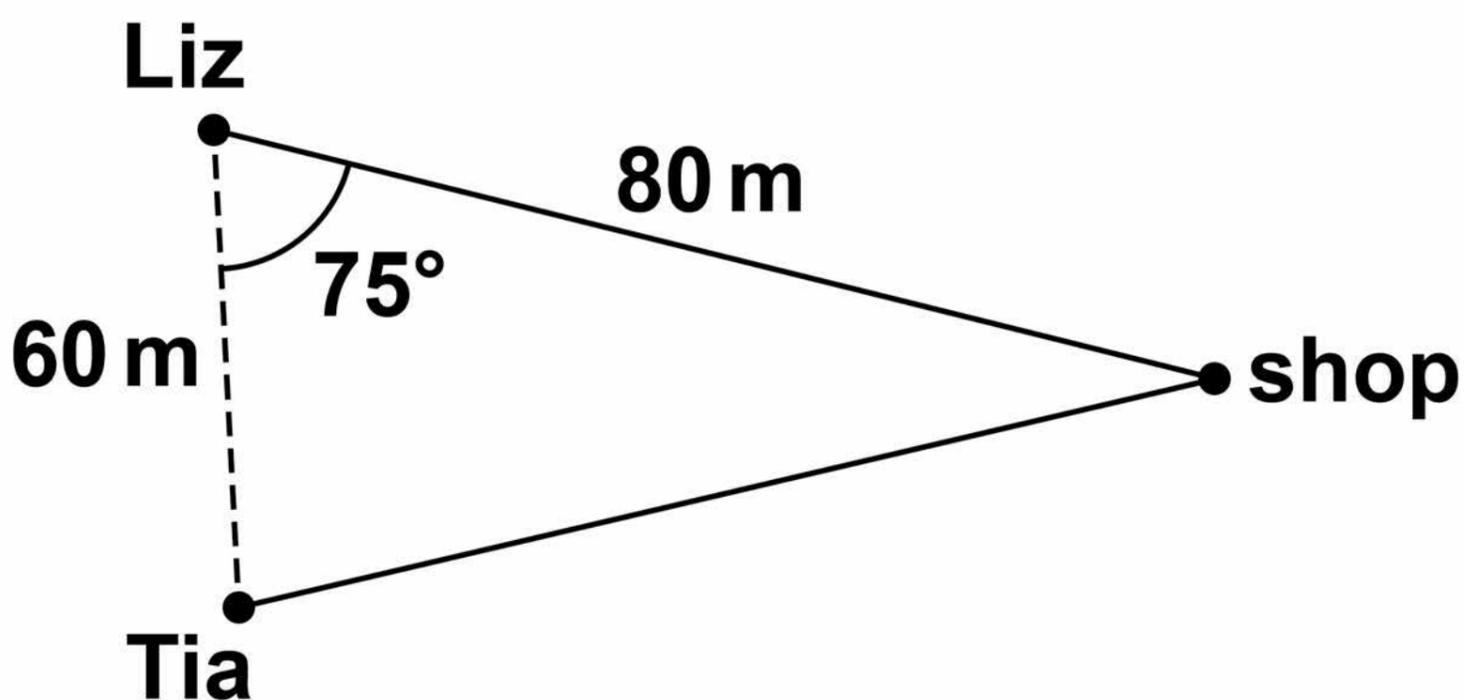
[Turn over]



21 Liz and Tia are walking towards a shop along different straight paths.

The diagram shows their positions at 2 pm

The diagram is not drawn accurately.



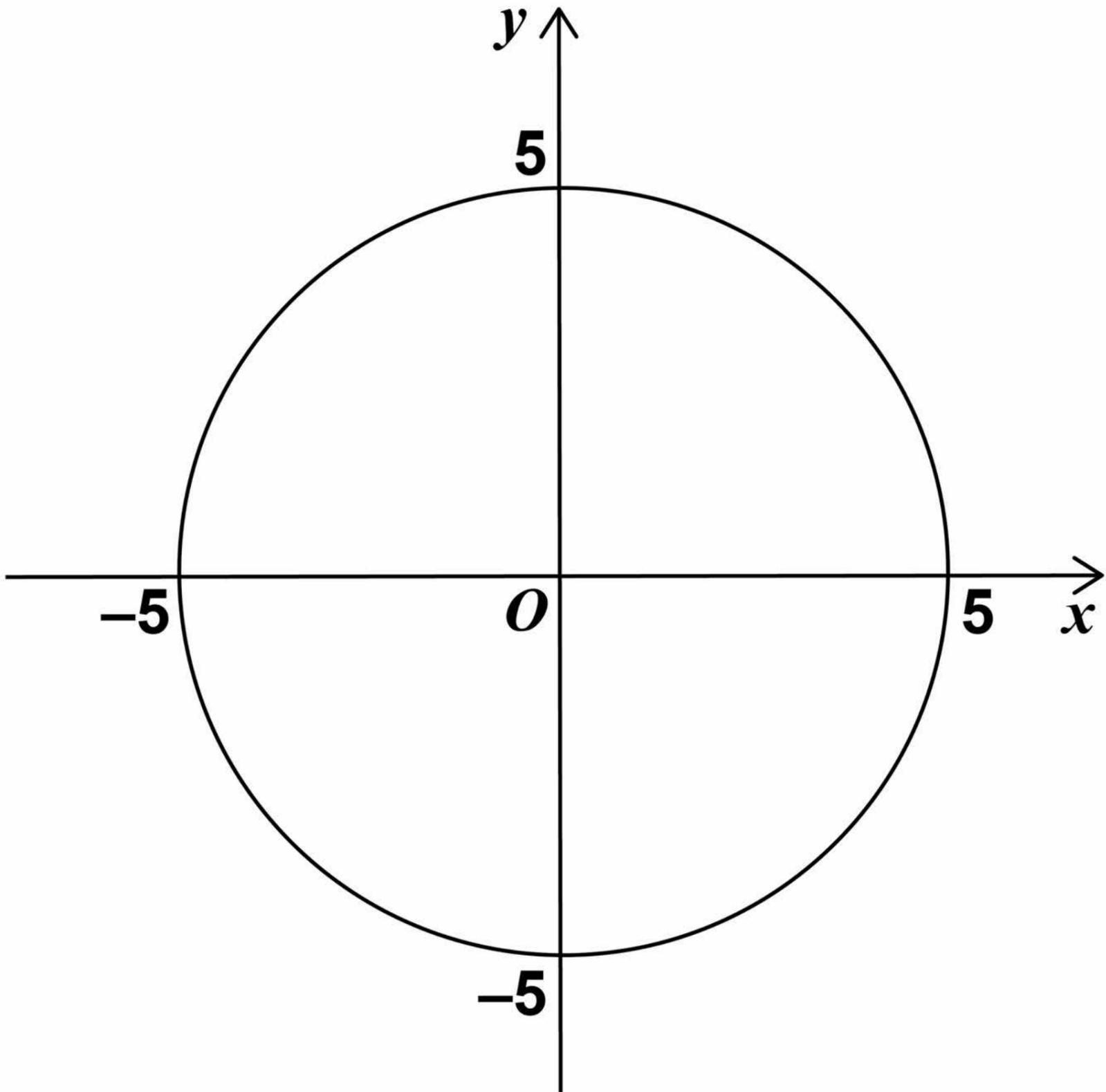
21 (a) Assume they walk at the same speed.

Who will arrive at the shop first?

You **MUST** show your working.

[3 marks]

- 22 A circle, centre O , passes through $(5, 0)$.



What is the equation of the circle?

Circle your answer. [1 mark]

$$x^2 + y^2 = 25$$

$$x^2 + y^2 = 5$$

$$x^2 + y^2 = 10$$

$$x^2 + y^2 = 100$$

[Turn over]

5



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24

A tank is a cuboid measuring
50 cm by 35 cm by 20 cm

All lengths are to the NEAREST
CENTIMETRE.

A container has a capacity of
EXACTLY 34 litres.

1 litre = 1000 cm³

Which has the greater capacity?

Tick ONE box.

Tank

Container

Cannot tell

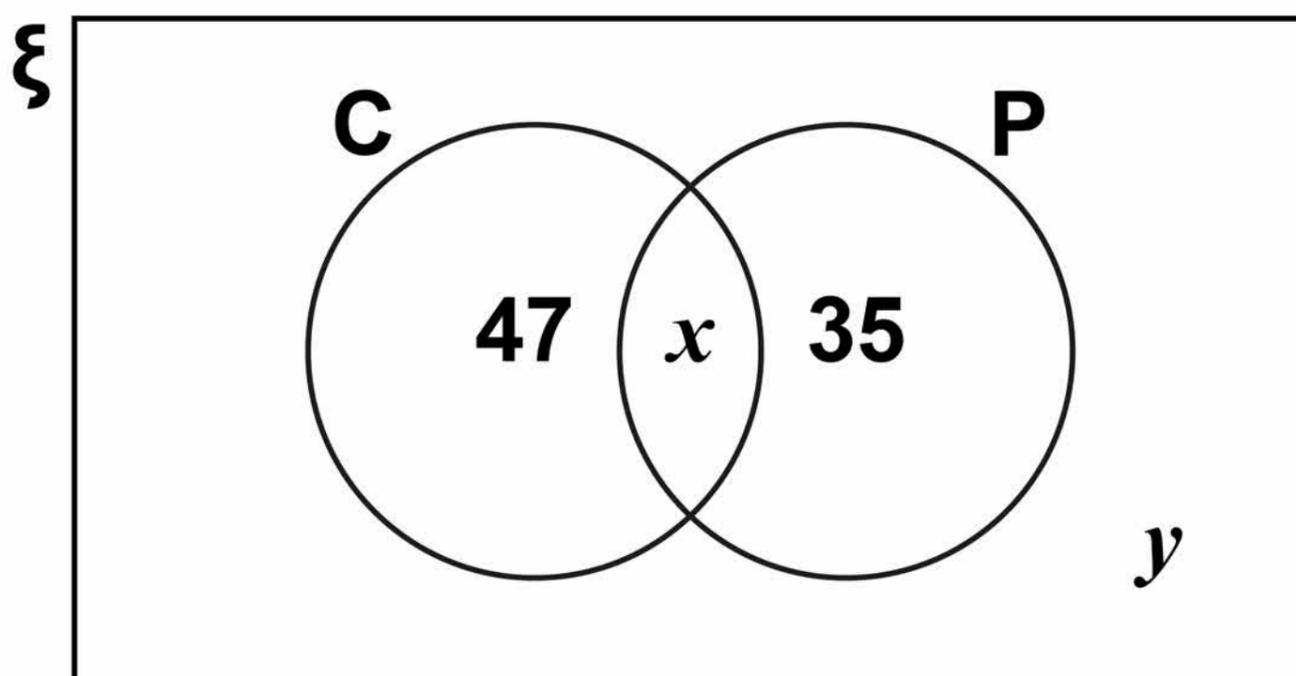


25 The Venn diagram shows some information about 150 students.

$\xi = 150$ students

C = students who study Chemistry

P = students who study Physics



The probability that a Physics student, chosen at random, also

studies Chemistry is $\frac{5}{12}$

One of the 150 students is chosen at random.

28 $f(x) = 5 - x$ and $g(x) = 3x + 7$

28 (a) Simplify $f(2x) + g(x - 1)$
[3 marks]

Answer _____

28 (b) Solve $g^{-1}(x) = 2x$
[3 marks]

$x =$ _____

9

END OF QUESTIONS



There are no questions printed on this page

For Examiner's Use	
Pages	Mark
4–5	
6–9	
10–13	
14–17	
18–19	
20–21	
22–25	
26–29	
30–33	
34–37	
38–41	
43–45	
46–48	
49–51	
TOTAL	

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